

production modifications are necessary. It also reveals the background mineral concentrations occurring naturally in the water that may be beneficial or toxic.

- Once a year, take samples from source water used in pesticide solutions to find out if you should add special buffering agents that enhance pesticide half-life and performance.

Submitting the sample

Submit samples, the appropriate fee and a completed *Solution Sample Information* sheet (form AD7). Information sheets are available online [select **Information Sheets** from the Agronomic Division home page]. You can also pick them up at any Cooperative Extension office or from the Agronomic Division office.

Fill out the form in the owner's name to facilitate information retrieval. Use permanent ink. Provide all information requested, and select the appropriate solution-use code from the list provided based on the intended use of the sample. The code influences interpretation of test results and the recommendations given on the report.

Obtaining the report

Solution samples are usually processed in two to three days. N.C. residents can access their reports online [select **Find Your Report** from the home page] and/or wait to receive reports through the mail. Reports for out-of-state samples are not currently available online but can be e-mailed upon request. Mailed reports come with an explanatory cover sheet. These cover sheets are also available online [select **Publications** from the home page].

Please keep solution analysis reports on file. They are valuable records that demonstrate patterns of environmental stewardship. Livestock and poultry farmers, in particular, should incorporate sampling and record keeping into their waste management plans.

NCDA&CS regional agronomists are available throughout the state to provide advice on sampling, interpreting report results and implementing recommendations. Names, county assignments and contact information are available online at www.ncagr.com/agronomi/rahome.htm.

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Sampling for Solution Analysis



The Agronomic Division analyzes water samples for mineral content. It also tests for specific chemical properties that indicate general water quality and that have an impact on agricultural production. Solution analysis indicates

- quality of surface and ground water supplies and likelihood of environmental impact;
- suitability of water for use in irrigation systems;
- suitability of water for livestock, poultry and aquaculture;
- suitability of nutrient solutions for plant production;
- suitability of media for container-grown plants through pour-thru leachate; and
- suitability of water for pesticide or nutrient solutions.

Recommendations provided in the solution analysis report indicate if a water supply needs to be modified to serve its intended purpose—livestock or poultry production; irrigation; aquaculture; source water for hydroponic, nutrient or pesticide solutions.

Although a mineral analysis indicates trends in water quality, its purpose is not to evaluate safety for human consumption. It does not detect the presence of organic pesticides or living organisms, such as coliform bacteria. For

information on these kinds of tests, contact your county health department.

Taking a representative sample

To be reliable, solution analysis requires a representative sample. Take samples of water to be used for agricultural purposes under the conditions in which the water will be used. You may want to take samples at several processing stages or time periods.

Sample containers should be clean and made of plastic. For complete analysis, a minimum of one-half pint of solution is required. Before filling the container, rinse it thoroughly with the solution being collected. Fill the container completely and screw the cap on tightly. Label the container with your name and the sample identifier.

■ **Wells.** Before sampling water from new wells or from wells recently treated with chemicals, run water one to two hours. Running the water five to ten minutes before sampling is usually sufficient for old wells. Longer times may be necessary if wells have not been used recently.

■ **Rivers or streams.** Sample from the middle of the stream at mid-depth. Avoid collecting surface or bottom residues.

■ **Lakes or ponds.** Choose location, depth and frequency of sampling based on the purpose of sampling and prevailing conditions. Avoid collecting surface or bottom residues since these contaminants alter results.

A convenient sampling device is easy to construct. Drill a telescoping rod—normally used in conjunction with a paint roller—to receive a small bolt. Mount a pint or quart

plastic container to the rod using flat washers to stabilize the bolt connection. The rod, which can telescope 6 to 12 feet, makes it easy to sample in hard-to-reach areas and away from banks of surface water supplies.

■ **Hydroponic systems.** Flush lines sufficiently to ensure that the sample is representative of a thoroughly mixed supply solution.

■ **Nutrient solutions.** Sample after diluting the nutrient concentrate for application and making any other necessary adjustments. The sample should have the same concentration as the solution being fed to the plants.

Sampling to diagnose problems

When production or environmental problems occur, solution analysis can provide information to help diagnose the problem. It is useful to collect samples over a period of time to isolate causal factors.

■ **Production problems.** Take samples from problem and nonproblem areas for comparison. When appropriate, take matching soil and plant samples from both areas as well. When troubleshooting a nutrient solution problem, sample both the source water and the nutrient solution. When troubleshooting a problem in a hydroponic system, take samples from final solutions and drainage (pour-thru leachate) solutions.

■ **Environmental problems.** Pinpointing a source of environmental impact requires taking several samples. For example, if you want to determine the source of excess nutrients entering a reservoir, you must take separate

samples from all streams or ditches that empty into it. As a general rule, take these samples monthly and after significant rainfall events.

Solution samples do not require special precautions, but it is best to deliver them to the laboratory as quickly as possible.

Sampling to monitor water quality

When monitoring the quality of a water source, take samples at regular intervals over time. Any extended wet or dry period can affect chemical properties.

■ **Environmental monitoring.** Sample farm water supplies at least twice a year to verify the effectiveness of existing stewardship practices. If there are signs of environmental impact, take monthly samples to verify results. Include observations of well construction, well depth, surface water diversions and proximity to livestock and poultry areas. For surface water investigations, note bordering areas and any diversions through riparian and grass buffers.

■ **Agricultural monitoring.** Base sampling frequency on the following general guidelines.

- Sample animal drinking water at least twice a year to verify that its quality is not adversely affecting performance.
- Sample irrigation water for field crops once a year to find out if the water is likely to cause production or application problems. More intensive sampling is necessary in coastal regions that may be subject to salt water intrusion.
- For high-value greenhouse crops, sample before each crop cycle. The analysis indicates whether acidification or other